

# **Comparison of Digital Panoramic Radiograph, Indirect Digital Imaging, Cone Beam Computed Tomography in Identification and Diagnosis of Periodontal Osseous Defects - an In Vitro Study**

## **Abstract**

### **Background**

Precise assessment of the bone condition is very much essential for the diagnosis, treatment planning, to determine the prognosis and also the outcome of periodontal therapy. Radiographs play a very important role in detection of osseous abnormalities in the jaw bone. Digital imaging techniques have brought in challenging opportunities for dental radiographic diagnosis. There has been a paradigm shift from a two dimensional radiographic techniques to the three dimensional techniques like cone beam computed tomography in diagnostic field.

### **Aims and objectives**

To compare the three different radiographic techniques with manual measurement which is considered as gold standard to determine the accuracy of dimensions with respect to

- i. Length, width, depth of furcation defects.
- ii. Length of horizontal defects.
- iii. Length of infrabony defects.

### **Materials and methods**

The present study is an invitro study in which ten dentate dry mandibles were used. A total of sixty sites with periodontal osseous defects (20 furcation, 20 horizontal, 20 infrabony defects) were identified and subjected to Cone beam computed tomography (CBCT),

Orthopanthamograph (OPG), Intraoral periapical radiograph (IOPA) using photostimulable phosphor (PSP) plates and also manual measurements with digital vernier calliper which is considered the gold standard against which all the measurements were compared. The furcation defects were measured for length, width and depth and horizontal and infrabony defects were measured for length.

## **Results**

Multiple comparison was done among the three groups (Group I furcation defects- length , width and depth, Group II- length of horizontal defects, Group III- length of infrabony defects) as measured by four different methods i.e. CBCT, OPG IOPA radiographs and manual measurements. The results of the multiple comparison for furcation width, length of horizontal and infrabony defects showed that there was a statistically insignificant difference between CBCT and manual measurements, and also between OPG and IOPA. But when manual measurements were compared with OPG and IOPA for the same, there was a statistically significant difference. CBCT also showed statistically significant difference with OPG and IOPA. The length of furcation defects as measured by OPG and IOPA radiographs was higher than that of CBCT and manual measurements. However the difference was statistically significant. Only CBCT and manual method allowed the measurement of depth of furcation. The measurements of manual method and CBCT for furcation depth was found to be statistically insignificant.

## **Conclusion**

All the three radiographic techniques were useful in determining the size of the periodontal osseous defects. CBCT allowed the measurements in all three planes i.e. coronal, sagittal, and axial planes which helped in better visualization of buccal and lingual cortical plates. The accuracy of CBCT was better than the traditional radiographic techniques (OPG, IOPA). This study suggests the usefulness and significant advantage of CBCT in the diagnosis and treatment planning of periodontal osseous defects. Further invivo studies are required to confirm these findings.

## **Key words**

**Periodontal osseous defects, CBCT, Conventional radiographs.**